BRAIDING FUNDAMENTALS AND SEAL FABRICATION AT ALBANY-TECHNIWEAVE

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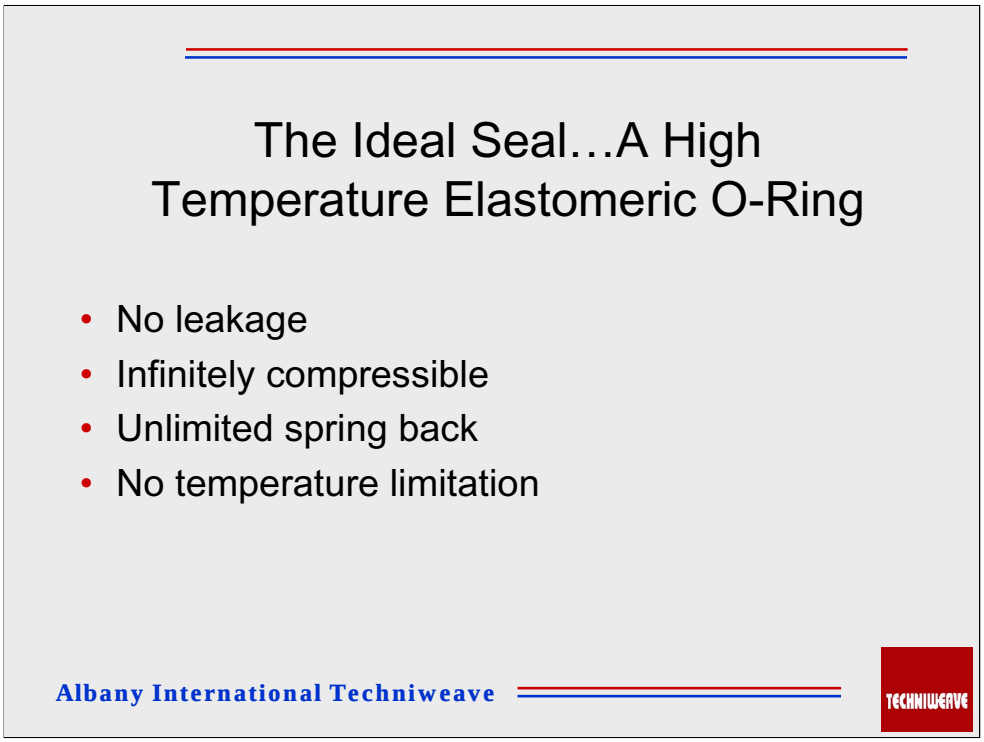
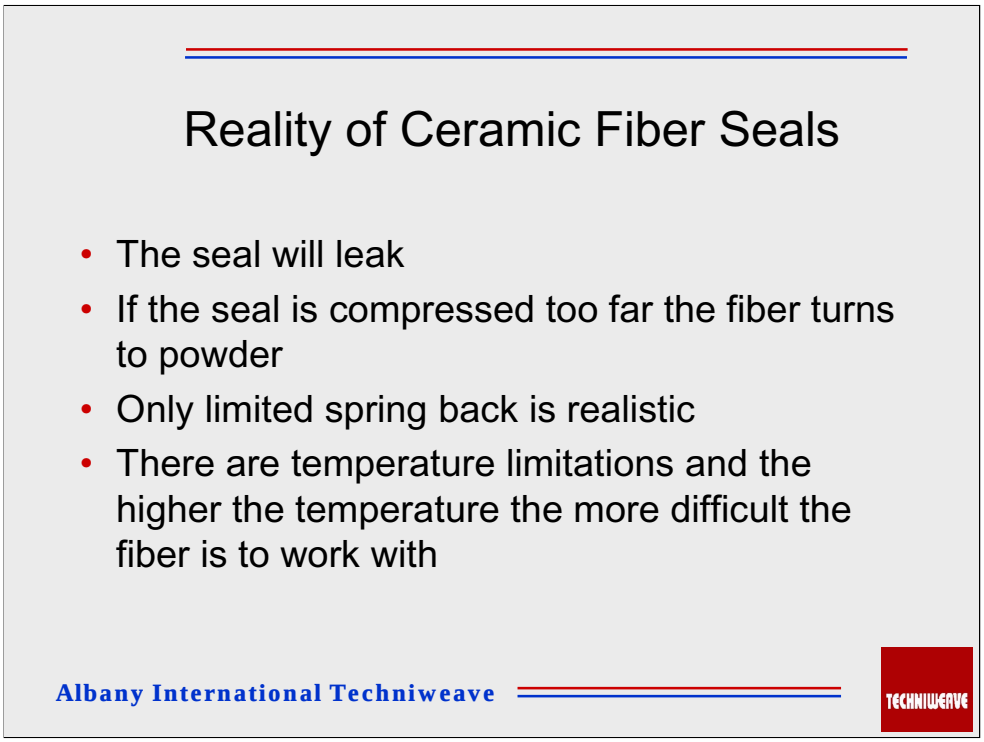
Albany International is the world's leading suppliers of Paper Machinery Clothing. Albany acquired Techniweave in March of 1998 and combined it with the Engineered Products Group of the Albany International Research Company (AIRESCO), Mansfield Massachusetts. The combined organization is known as Albany International Techniweave, Inc.. Techniweave and the Engineered Products Group provided products and services to many of the same customers and were viewed as complimentary businesses.

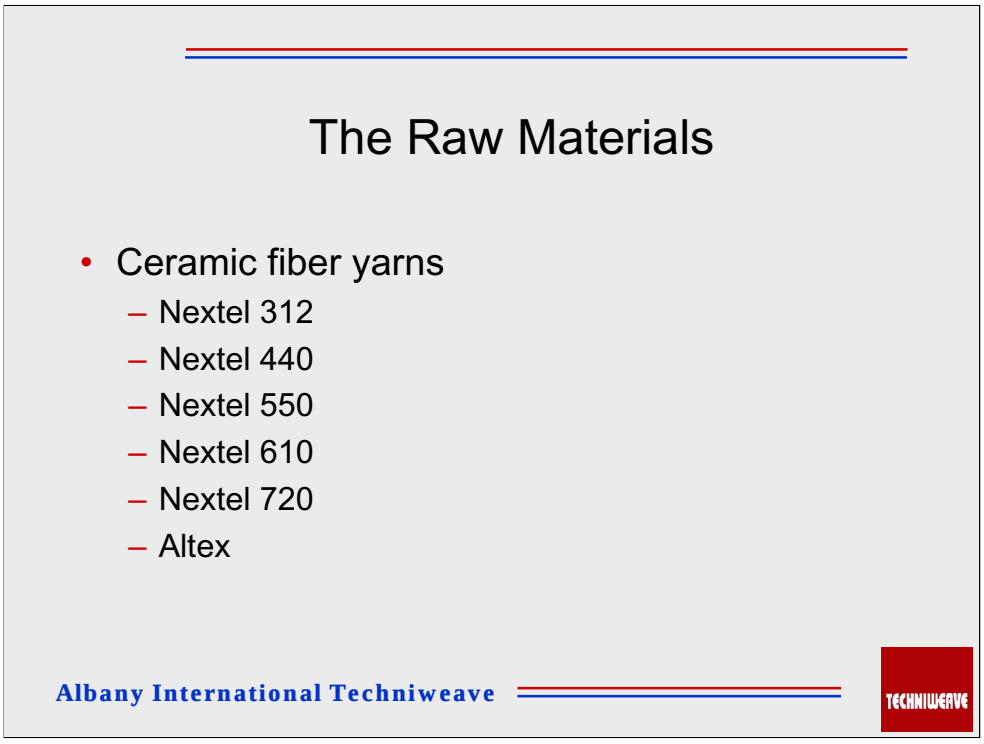
This facility will be the new home of Albany International Techniweave Inc. It is anticipated that all equipment and personnel will be relocated in January of 2000. The site allows for the expansion of the base building on an incremental basis as needed.



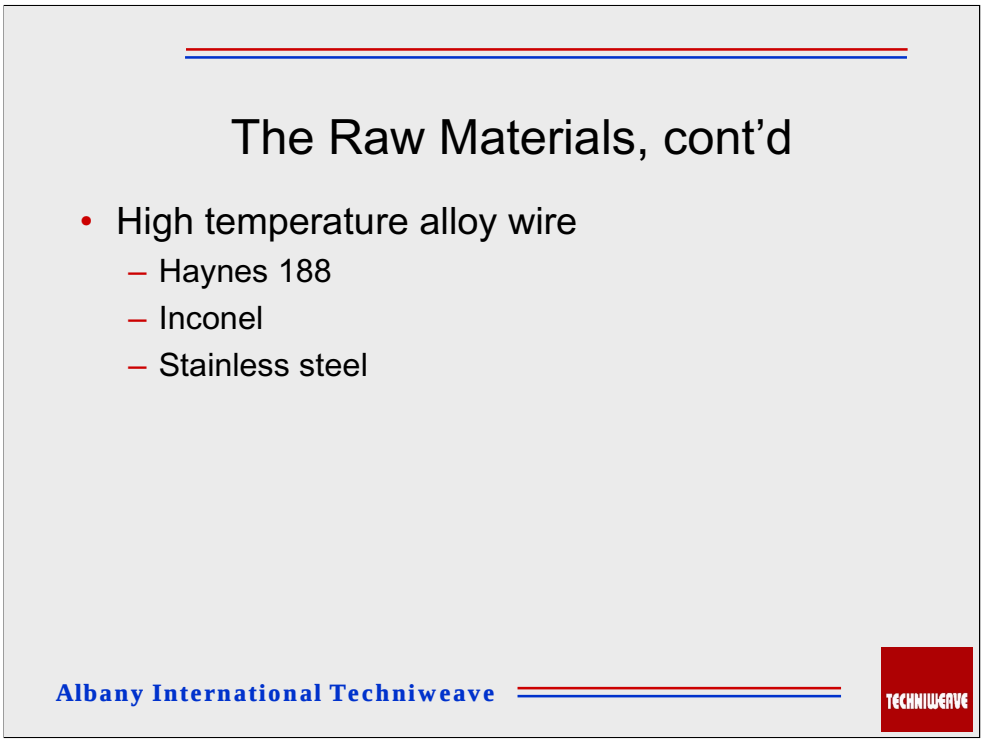
The ideal high temperature seal would have the same properties as an elastomeric O-ring but without the temperature limitations.



The reality of high temperature seals is often far from the ideal. Engineers are forced to find innovative methods for utilizing ceramic seals.



Ceramic seals can be fabricated from a number of commercially available yarns. The specific yarn choice is guided by the max use temperature and the environment. Typical prices for yarns range from $75 to $750 per pound.



Hybrid braids, (ceramic core with metallic sheath) offer increased environmental resistance where vibration and/or air flow past the seal is anticipated

Nextel Ceramic Fiber Typical Properties

Nextel 312, 440, 550, 610 & 720

Property	Units	Nextel 312	Nextel 440	Nextel 550	Nextel 610	Nextel 720
Filament Diameter	µm	10-12	10-12	10-12	10-12	10-12
Crystal Type		$9Al_2O_3$: $2B_2O_3$ + amorph. SiO_2	gamma Al_2O_3 + mullite + amorph. SiO_2	gamma Al_2O_3 + amorph. SiO_2	alpha Al_2O_3	alpha Al_2O_3 + mullite
Density	g/cm^3	2.70	3.05	3.03	3.88	3.40
Filament Tensile Strength (25,4mm gauge)	Mpa ksi	1700 250	2000 290	2000 290	2930 425	2100 300
Filament Tensile Modulus	Gpa msi	150 22	190 27	193 28	373 54	260 38
Chemical Composition	wt%	62 Al_2O_3 24 SiO_2 14 B_2O_3	70 Al_2O_3 28 SiO_2 2 B_2O_3	73 Al_2O_3 27 SiO_2	>99 Al_2O_3	85 Al_2O_3 15 SiO_2
Allowable Yield Variation	yds/lb.	specified ± 10%	specified ± 10%	specified ± 10%	specified ± 10%	specified ± 10%

Albany International Techniweave

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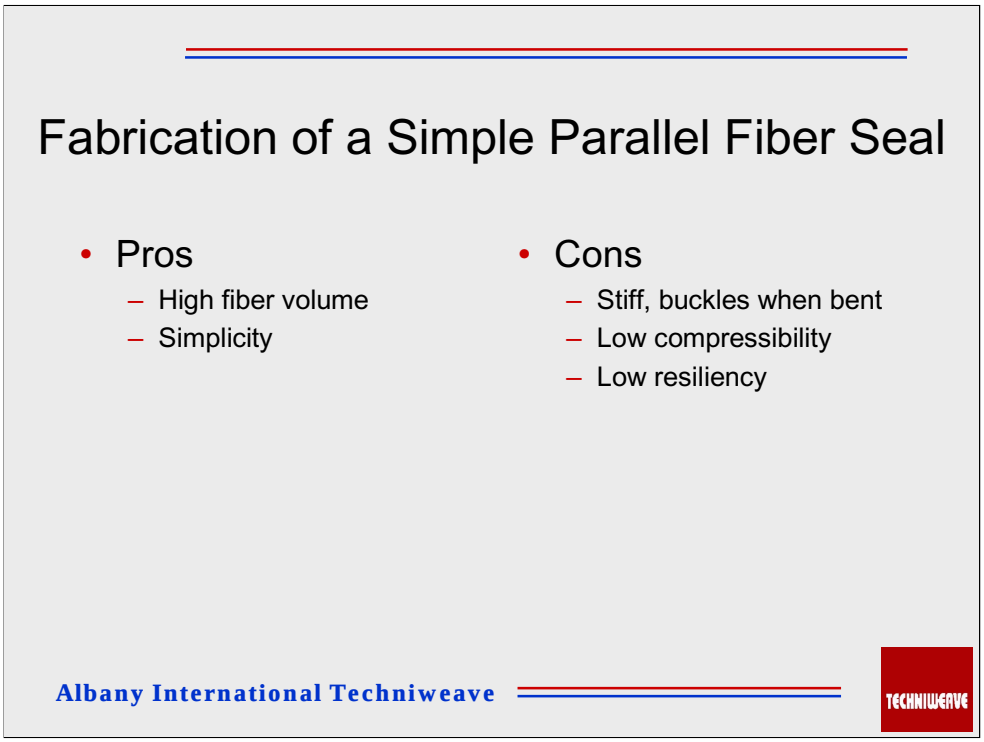
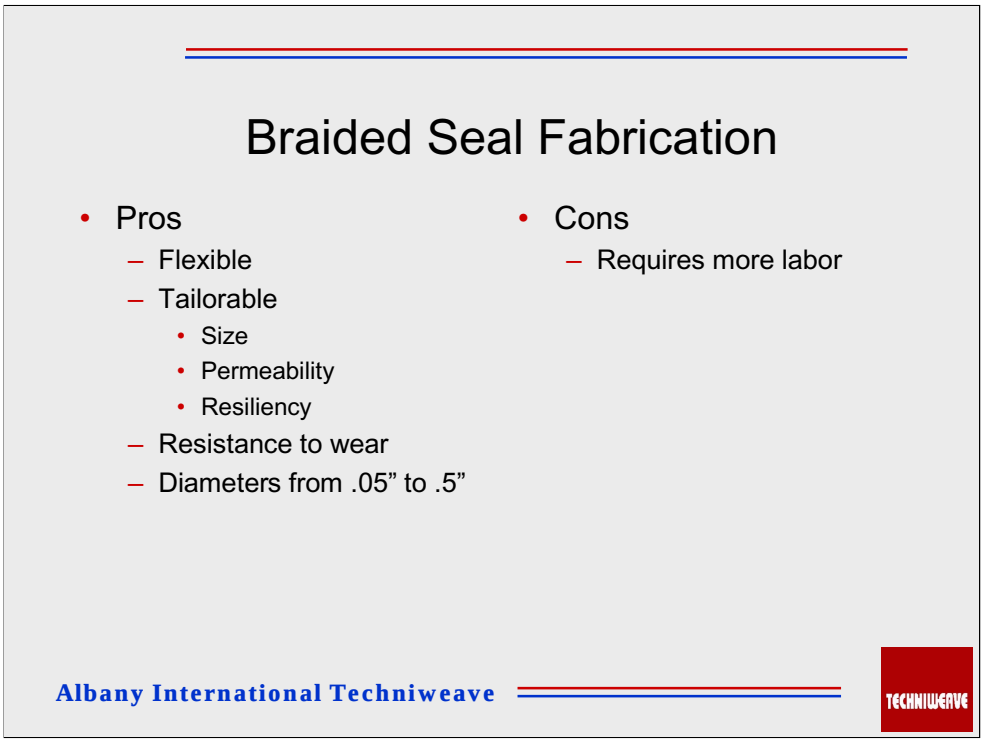
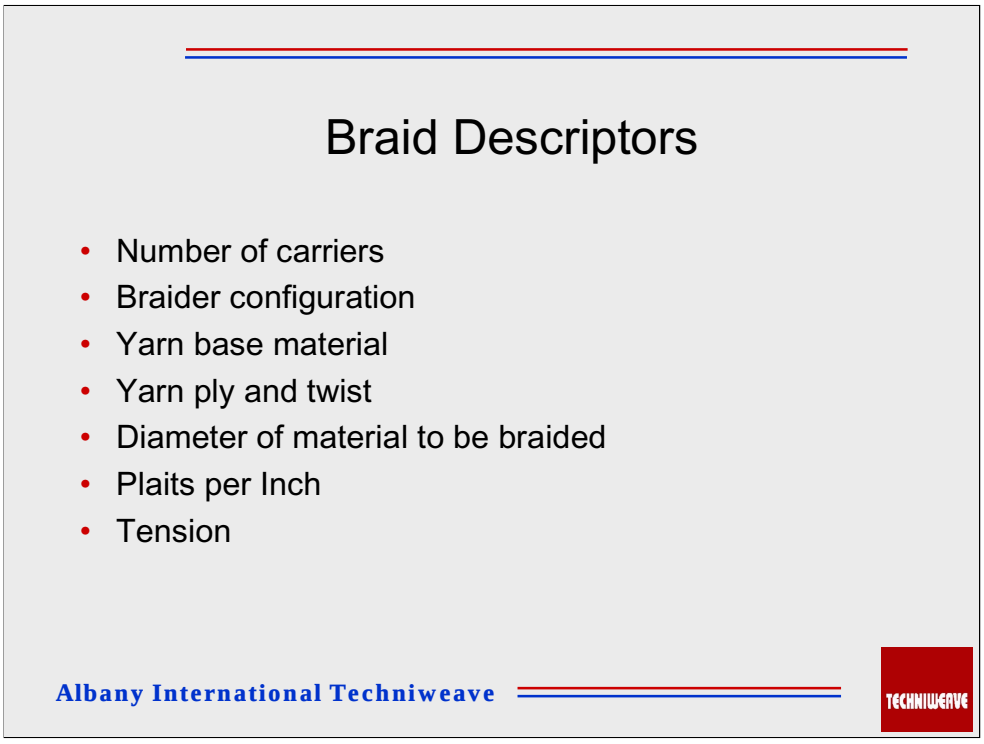
The data included here is copied form the 3M Nextel data handbook. The yield of the incoming material is indicated as +/- 10%. This potential variability presents special challenges to the fabricator and the end user.



Some of the earliest seals were fabricated by over-wrapping an inner core of parallel fibers. This construction is still favored for some specific applications. The seal has relatively low leakage but lacks flexibility and resiliency.

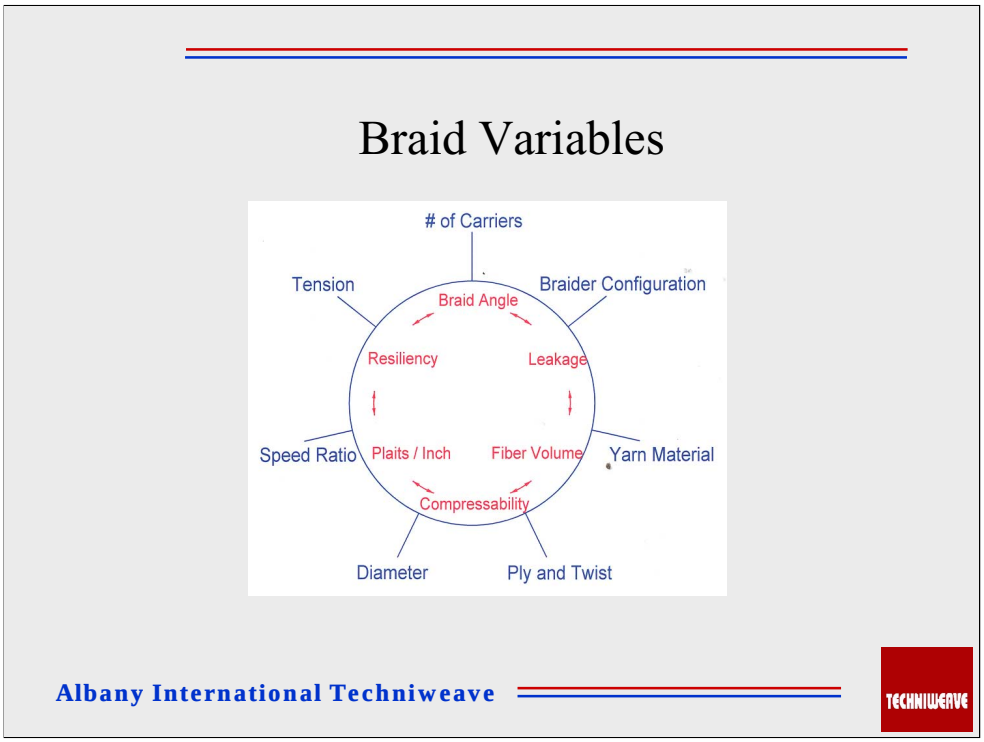


Braided seals consist of a minimal core with layer over layer of braided ceramic fibers. The characteristics of the seal can be tailored to fit the specific application. The multiple layers increase the labor costs significantly. However, the resulting seals are conformable and can be provided in a wide range of materials and architectures.



These descriptive terms are used to provide a definition of the braid and its architecture. Each layer in a seal would have is own description.

A finished seal can be described the these characteristics.



The braiding parameters shown in blue can be changed independently of each other and will effect all of the characteristics shown in red. It is impossible to change any of the seal characteristics shown in red without effecting all of them. Thus the fabrication of a textile braid differs greatly from other manufacturing processes. The braid is a study in equilibriums, where all of the properties are interactive and cannot be held constant while changing only one variable.